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A New Species of *Moolapheonoides* (Crustacea: Amphipoda) from Sagami Bay, Japan

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Abstract A new species of the genus *Moolapheonoides* (Cyproideidae) is described from an intertidal gravel beach in Sagami Bay, central Japan. This is the first record of the genus from the Northern Hemisphere.

Key words: Gammaridea, Cyproideidae, Sagami Bay, the first record in the Northern Hemisphere

Introduction

The genus *Moolapheonoides* (type species: *M. kadee* Barnard, 1974) was established based on three species from Australia (Barnard, 1974). Though *Moolapheonoides* is similar to *Austropheonoides* and *Narapheonoides* in general morphology, the genus is easily distinguished from *Austropheonoides* by the presence of subchelate gnathopod 1, and from *Narapheonoides* by the presence of mandibular palp (Barnard, 1974; Barnard and Karaman, 1991). *Moolapheonoides* has been known to comprise only 5 species and 1 subspecies, all from the Southern Hemisphere (Barnard, 1974; Ledoyer, 1982; Myers, 1985; Thomas, 1999).

During the course of an ecological study of gammaridean amphipods conducted by the first author at Manazuru, west coast of Sagami Bay, many amphipod specimens were collected using sledge net. Among them, a small collection of an undescribed species of *Moolapheonoides* was found. This paper describes the new species, which is the first representative of *Moolapheonoides* in the Northern Hemisphere.

Materials and Methods

All specimens were collected by the first author, at Manazuru, Kanagawa Prefecture, Japan (35°09'N, 139°09'E) on April 4, 1996. They were taken in very shallow water (about 0.9 m depth) with a sledge net (0.1 m height, 0.3 m width, mesh size NGG54) by towing 9 m along the shoreline. Collection site was a sheltered gravel-beach. The samples from the net were immediately fixed with 5% buffered formalin-seawater, and they were sorted under a stereomicroscope and preserved in 70% ethanol in a laboratory.

The holotype and paratypes were dissected and mounted on glass slides with gum-chloral medium (Itô, 1985) dissolved with acid fuchsin.

The type-series are deposited in the National Science Museum, Tokyo (NSMT).

Moolapheonoides acutifalcatus sp. nov.

(Figs. 1-3)

Material examined

Holotype: NSMT-Cr 13417, ovigerous female (2.4 mm). Paratypes: NSMT-Cr 13418, juvenile no. 1 (1.9 mm); NSMT-Cr 13419, juvenile no. 2 (1.7 mm); NSMT-Cr 13420, juvenile no. 3 (1.6 mm).

Etymology

The specific name, *acutifalcatus*, refers to the strongly curved dactylus of gnathopod 2.

Description of holotype (ovigerous female, 2.4mm)

Head (Fig. 1A) rather small.

Antenna 1 (Fig. 1C) very short and stout, peduncular article 1 2.1 times as long as article 2, peduncular article 2 1.5 times as long as article 3; primary flagellum 1.7 times as long as article 3, 4-articulate, suddenly attenuating, article 1 with numerous aesthetascs; accessory flagellum button-shaped. Antenna 2 (Fig. 1D) slender, 0.9 times as long as antenna 1, gland cone obtuse; flagellum 4-articulate, 1.2 times as long as peduncular article 5.

Mandible (Figs. 1G-I) with 3-articulate palp, article 2 as long as 1, article 3 twice as long as 2; molar process well-developed, triturating; incisor strongly dentate; lacinia mobilis on left mandible, strongly dentate; spine row with 8 spines on left and 9 spines on right.

Maxilla 1 (Fig. 1J): outer plate with 7 distal spines; inner plate small, with acute apex; palp 1-articulate, with acute process apically, with 3 setae along lateral margin.

Maxilliped (Figs. 1L-N): inner plate with 2 apical spines and 2 mediofacial spines; outer plate with 2 apical spines, medial margin pubescent, lined with 3 or 4 setules; palp article 2 as long as article 1, with 3 or 4 setae on mediodistal lobe; article 3 1.5 times as long as article 2, distally produced, with apically 3-forked stout spine and 1 seta on medial margin; article 4 as long as article 2, falcate, apically blunt.

Gnathopod 1 (Figs. 2A, B) scarcely subchelate; coxa very small, hidden by coxa 3; basis slender, with short setules along anterior margin; carpus with distal lobe, reaching 1/3 length of propodus, with 2 posterior setae marginally and 1 seta and 1 plumose spine apically; propodus 0.5 times as long as basis, 3.1 times as long as wide, with 2 plumose spines anteriorly; palm very short, palmar angle with 2 plumose spines; dactylus falcate, 3.3 times as long as palm, with tooth on distal 1/3, accompanied with 8 small spines proximally. Gnathopod 2 (Figs. 2C, D) transverse or weakly parachelate; coxa very small, hidden by coxa 3, with anterior seta; basis slender, with short setules along anterior margin; merus rounded distally, with tuft of spine-setae; carpus elongate, posterior margin with 1 seta, posterodistal lobe weak, accompanied with 2 setae and 1 plumose spine; propodus weakly dilating, as long as carpus, 2.4 times as long as wide; palm concave, palmar angle acute, with 2 spines; dactylus as long as palm, strongly curved, with distal tooth and 3 spines.

Pereopod 3 (Fig. 2E): coxa (Fig. 3A) very large, anterior margin rounded, posterior margin slightly concave; basis slender, with setules along anterior margin; merus with spines along both anterior and posterior margins; carpus and propodus of equal length, with spines along posterior margin; dactylus 0.5 times as long as propodus. Pereopod 4 (Fig. 2F): coxa (Fig. 3B) slightly larger than coxa 3, anterior margin almost straight, posterior margin expanding posteriorly, slightly excavate; carpus to dactylus shorter than in pereopod 3. Pereopod 5 (Fig. 2G): coxa expanding posteroventrally, about 1.7 times as broad as deep; basis linear, with 3 spines along anterior margin, with small spines along posterior margin; merus slightly longer than ischium, posterodistal angle weakly produced, with 3 small spines along posterior margin; carpus to dactylus missing. Pereopod 6 (Figs. 2H, I): coxa expanded posteroventrally; basis expanding posterodistally, ovato-rectangular, with 3 spines along anterior margin; posterodistal angle of merus subacutely produced, 0.4 times as long as anterior margin, with 3 small spines along posterior margin; carpus to dactylus missing. Pereopod 7 (Fig. 2J): basis, anterior margin shortened, with 5 spines, posterior lobe strongly expanding, widened distally, distal margin truncate, proximal angle acutely produced; posterodistal angle of merus subacutely produced, as long as anterior margin, with 2 small spines; carpus to dactylus missing.

Pleopods 1-3 (Figs. 3D-F) similar to each other; peduncle slightly shorter than rami, with 2 coupling spines on mediodistal angle; inner ramus consisting of 9 articles, outer ramus of 7 articles.

Uropod 1 (Fig. 3G) slender, longest, exceeding apex of uropod 3; peduncle minutely pectinate along medial margin; rami of subequal length, as long as peduncle, pectinate along medial margin. Uropod 2 (Fig. 3H): peduncle minutely pectinate along medial margin; outer ramus as long as peduncle, 0.8 times as long as inner ramus. Uropod 3 (Fig. 3I): peduncle minutely pectinate along medial margin, sharpened on laterodistal end; inner ramus 1.8 times as long as peduncle; outer ramus



Fig. 1. *Moolapheonoides acutifalcatus* sp. nov. Holotype, ovigerous female (2.4 mm): A, habitus; C, antenna 1 (medial view); D, antenna 2 (medial view); G, right mandible; H, left mandible; I, distal part of left mandible; J, maxilla 1; L, maxilliped; M, distal part of maxilliped palp; N, distal part of maxilliped outer plate. Paratype, no. 3, juvenile (1.6 mm): B, head; E, upper lip; F, lower lip; K, maxilla 2. Scale bars 0.1 mm, if not mentioned.

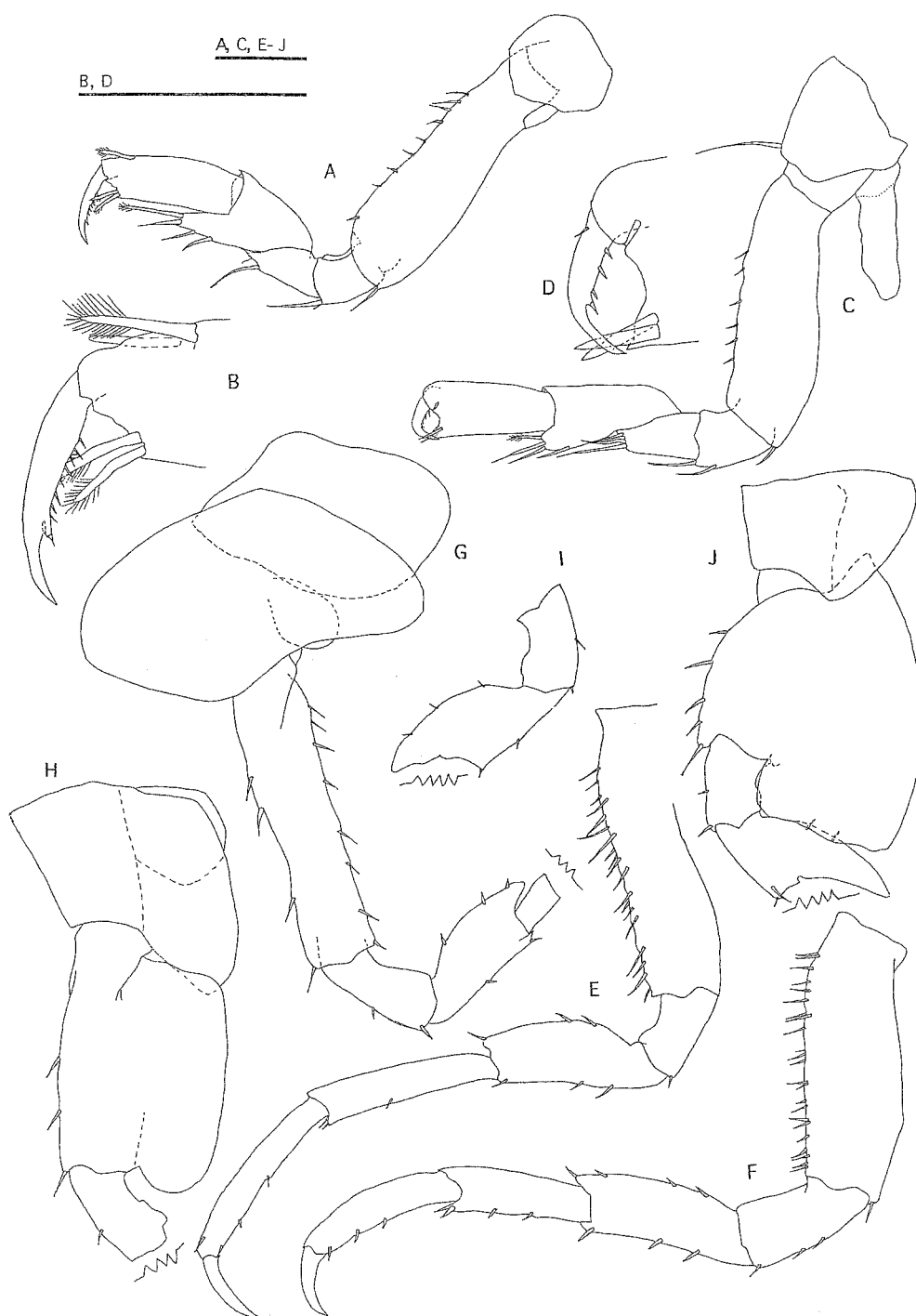


Fig. 2. *Moolapheonoides acutifalcatus* sp. nov. Holotype, ovigerous female (2.4 mm): A, B, gnathopod 1; C, D, gnathopod 2; E-H, pereopods 3-6; I, ischium and merus of right pereopod 6; J, pereopod 7. Scale bars 0.1 mm.

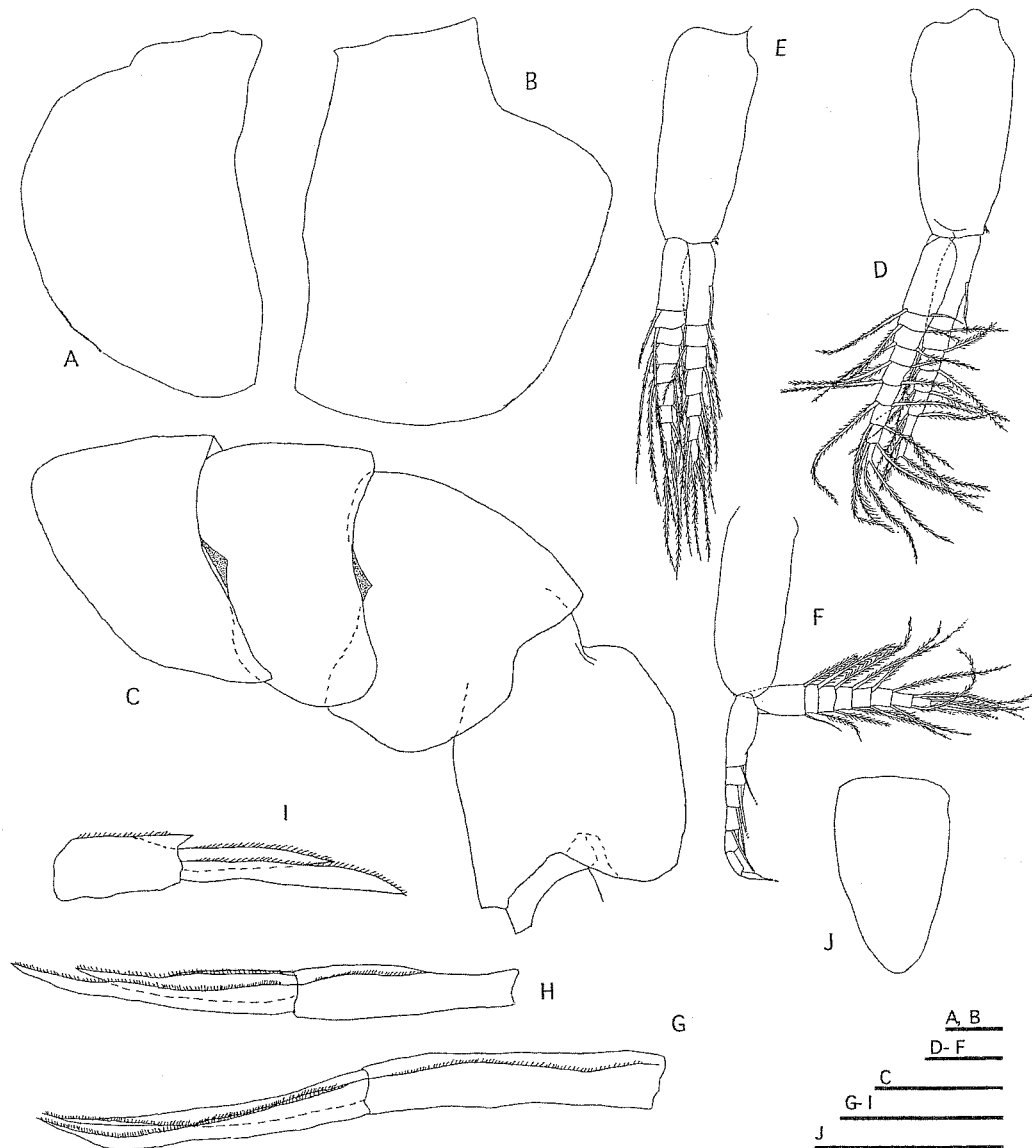


Fig. 3. *Moolapheonoides acutifalcatus* sp. nov. Holotype, ovigerous female (2.4 mm): A, coxa 3; B, coxa 4; D-F, pleopods 1-3; G, H, uropods 1, 2; I, right uropod 3. Paratype, no. 1, juvenile (1.9 mm): C, pleonites 1-3 and urosomite 1. Paratype, no. 3, juvenile (1.6 mm): J, Telson.

0.7 times as long as inner ramus.

Description of paratype no. 1 (juvenile, 1.9mm)

Epimeral plate 1 (Fig. 3C): posteroventral angle acutely produced. Epimeral plate 2 (Fig. 3C) posteroventrally rounded. Epimeral plate 3 (Fig. 3C) with concave ventral margin, posteroventral angle obtusely beveled.

Urosomite 1 (Fig. 3C) very large, dorsally keeled; dorsal keel low, evenly truncate, its height 0.3 times as long as its length.

Description of paratype no. 3 (juvenile, 1.6mm)

Head (Fig. 1B): rostrum of medium length, with blunt apex; lateral cephalic lobe broad, weakly emarginate. Eyes large, round.

Upper lip (Fig. 1E) apically bilobate, symmetrical. Lower lip (Fig. 1F): shoulders bluntly produced inward.

Maxilla 2 (Fig. 1K): outer plate narrow, with 4 spines and 1 seta distally; inner plate with 2 small spines on laterodistal corner, 2 large spines and 1 seta on mediodistal corner.

Telson (Fig. 3J) entire, 1.8 times as long as wide, semioval.

Remarks

This species exhibits morphological characters provided below, which were designated as diagnoses of the genus *Moolapheonoides* (Barnard, 1974; Thomas, 1999); mandible has 3-articulate palp; gnathopod 1 is scarcely subchelate and its propodus is neither attenuate nor tapering; coxae 3-4 are immensely broadened, with contiguous margins abutting; coxa 2 is hidden; bases of pereopod 6-7 are expanded; urosomite 1 is dorsally keeled, elongate.; telson is elongate, almost reaching apex of peduncle on uropod 3.

The genus *Moolapheonoides* has been reported only from the Southern Hemisphere: *M. kadee* Barnard, 1974, *M. coocoo* Barnard, 1974 and *M. poontee* Barnard, 1974 from Australia, *M. angustipes* Ledoyer, 1982 from Madagascar, *M. coocoo* serua Myers, 1985 from Fiji, and *M. utmas* Thomas, 1999 from Papua New Guinea. The present new species is the first representative of the genus from the Northern Hemisphere, extending the distribution of *Moolapheonoides* to the North Pacific.

Apparently this species is very rare at this sampling station, as the specimens were caught only in several tows on a day (see Materials and Methods) throughout the monthly samplings which were carried out every 1h for 24h from November 1995 to October 1996.

The new species is distinguished from *M. kadee* in the following points: accessory flagellum is shorter; medial margin of outer plate on maxilliped is pubescent, lined with 3 or 4 setules; propodus of gnathopod 1 lacks spines on posterior margin; dactylus of gnathopod 2 is strongly curved and armed with several spines; bases of pereopods 3-5 are lined with setules more densely; basis of pereopod 7 is trapezoidal; dorsal keel of urosomite 1 is low and evenly truncate.

Differing from *M. coocoo*, lateral cephalic lobe is broad; article 3 of mandibular palp is elongate; propodus of gnathopod 1 lacks posterior spines; palm of gnathopod 2 is evenly excavate; ischia of pereopods 5-7 are not elongate; basis of pereopod 7 is trapezoidal; dorsal tooth is lacking on pleonite 3; and dorsal keel on urosomite 1 is not recurved anteriorly.

From *M. poontee*, lateral cephalic lobe is broad; accessory flagellum is short; outer lobe of lower lip is notched; coxa 1 is not produced anteriorly; basis of gnathopod 1 is less setulose; posterior margin of propodus of gnathopod 1 is naked; posterodistal lobe of article 5 of gnathopod 2 is less elongate; palm of gnathopod 2 is not oblique; posterior lobe of coxa 6 is deeper; basis of pereopod 7 is more expanding and trapezoidal; dorsal tooth is lacking on pleonite 3; dorsal keel on urosomite 1 is taller in posterior extension.

From *M. angustipes*, lateral cephalic lobe is broad, almost truncato-concave; bases of gnathopods and pereopods are armed with several setules or small spines; basis of pereopod 6 is ovate; basis of

pereopod 7 is trapezoidal; and dorsal keel of urosomite 1 is not acute posteriorly.

From *M. coocoo* serua, lateral cephalic lobe is broad; palm of gnathopod 2 is evenly excavate; bases of pereopods 3 and 4 are armed with several setules; and ischia of pereopods 5-7 are not elongate.

From *M. utmas*, basis of gnathopod 1 is armed with several setules or small spines; posterodistal lobe of article 5 of gnathopod 2 is less elongate; propodus of gnathopod 2 is not armed with posterior spine; palm of gnathopod 2 is not oblique; ischia of pereopods 5-7 are not elongate; basis of pereopod 7 is truncate along distal margin.

A simple key of the genus *Moolapheonoides*:

1. Merus of pereopods 5-7 elongated (longer than article 4) 2
 Merus of pereopods 5-7 not elongated (shorter than article 4) 4
2. Pereonites 3-4 greatly expanded dorsolaterally *M. utmas*
 Pereonites 3-4 not expanded dorsolaterally 3
3. Merus of pereopods 7 lacking developed posterior flange *M. coocoo*
 Merus of pereopods 7 with developed posterior flange, broadest distally *M. coocoo serua*
4. Gnathopod 2 with posterior seta on palm (besides defining setae of palm)
 *M. poontee*
 Gnathopod 2 lacking posterior setae on palm (besides defining setae of palm) 5
5. Basis of pereopod 6 slender and not lobate, gnathopod 2 lacking posterior seta on palm
 *M. angustipes*
 Basis of pereopod 6 broad and lobate, gnathopod 2 with posterior seta on palm 6
6. Dactylus of gnathopod 2 strongly curved and with several spines on posterior margin
 *M. acutifalcatus*
 Dactylus of gnathopod 2 not strongly curved and lacking several spines on posterior margin
 *M. kadee*

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